

SEQUENCE LISTING

SEQ ID NO:1

5 Nucleotide sequence for HCMV Toledo US28 (same sequence as AU4.1)

ATGACACCGACGACGACGACCGCGGAACCTCACGACGGAGTTTGACTACGATGAA
GCCGCGACTCCTTGTGTTTTACCGACGTGCTTAATCAGTCAAAGCCGGTTACGT
TGTTTCTGTACGGCGTTGTCTTTCTGTTCCGGTTCATCGGCAACTTCTTGGTGATC
TTCACCATCACCTGGCGACGTGCGATTCAATGCTCCGGCGATGTTTACTTTATCA
10 ACCTCGCGGCCGCGGATTTGCTTTTCGTTTGTACACTACCTCTGTGGATGCAATAC
CTCCTAGATCACAACCTCCCTAGCCAGCGTGCCGTGTACGTTACTCACTGCCTGTTT
CTACGTGGCTATGTTTGCCAGTTTGTGTTTTATCACGGAGATTGCACTCGATCGCT
ACTACGCTATTGTTTACATGAGATATCGGCCTGTAAAACAGGCCTGCCTTTTCAG
TATTTTTTGGTGGATCTTTGCCGTGATCATCGCCATTCCACATTTTATGGTGGTGA
15 CCAAAAAAGACAATCAATGTATGACCGACTACGACTACTTAGAGGTCAGCTACC
CGATCATCCTCAACGTAGAACTCATGCTCGGTGCTTTCGTGATCCCGCTCAGTGT
CATCAGCTACTGCTACTACCGCATTTCCAGAATCGTTGCGGTGTCTCAGTCGCGC
CACAAAGGTCGCATTGTACGGGTACTTATAGCGGTGCTGCTTGTCTTTATCATCTT
TTGGCTGCCGTACCACCTAACGCTGTTTGTGGACACGTTAAAACTCCTCAAATGG
20 ATCTCCAGCAGCTGCGAGTTCGAAAGATCGCTCAAACGTGCGCTCATCTTGACCG
AGTCGCTCGCCTTTTGTCACTGTTGTCTCAATCCGCTGCTGTACGTCTTCGTGGGC
ACCAAGTTTCGGCAAGAACTGCACTGTCTGCTGGCCGAGTTTCGCCAGCGACTCT
TTTCCCGCGATGTATCCTGGTACCACAGCATGAGCTTTTCGCGTCGGAGCTCGCC
GAGCCGAAGAGAGACATCTTCCGACACGCTGTCCGACGAGGTGTGTGCGGTCTC
25 ACAAATTATACCGTAA

SEQ ID NO:2

Amino acid sequence for HCMV Toledo US28 (same sequence as AU4.1)

MTPTTTTAELTTEFDYDEAATPCVFTDVLNQSKPVTFLYGVVFLFGSIGNFLVIFTIT
30 WRRRIQCSGDVYFINLAAADLLFVCTLPLWMQYLLDHNSLASVPCTLLTACFYVAM
FASLCFITEIALDRYYAIVYMRYRPVKQACLFSIFWWIFAVIIAIPHFMVVTKKDNQC
MTDYDYLEVSYPHILNVELMLGAFVIPLSVISYCYRISRIVAVSQSRHKGRIVRVLIA
VVLVFIIFWLPYHLTLFVDTLKLLKWISSSCEFERSLKRALILTESLAFCHCCLNPLLY

VFVGTKFRQELHCLLAEFRQRLFSRDVSWYHSMFSR RSPSRRETSSDTLSDEVCRV
SQIIP*

5 SEQ ID NO:3

Nucleotide sequence for HCMV VHL/E US28

ATGACACCGACGACGACGACCGCGGA ACTCACGACGGAGTTTGACTACGACGAT
GAAGCGACTCCCTGTGTCCTACCGACGTGCTTAATCAGTCGAAGCCAGTCACGT
TGTTTCTGTACGGCGTTGTCTTTCTCTTCGGTTC CATCGGCAACTTCTTGGTGATCT
10 TCACCATCACCTGGCGACGTCGGATTCAATGTTCCGGCGATGTTTACTTTATCAA
CCTCGCGGCCGCCGATTTGCTTTTCGTTTGTACACTACCTCTGTGGATGCAATACC
TCCTAGATCACA ACTCCCTAGCCAGCGTGCCGTGTACGTTACTCACTGCCTGTTTC
TACGTGGCTATGTTTGCCAGTTTGTGTTTTATCACGGAGATTGCACTCGATCGCTA
CTACGCTATTGTTTACATGAGATATCGGCCTGTAAAACAGGCCTGCCTTTTCAGT
15 ATTTTTTGGTGGATCTTTGCCGTGATCATCGCCATTCCACACTTTATGGTGGTGAC
CAAAAAAGACAATCAATGTATGACCGACTACGACTACTTAGAGGTCAGTTACCC
GATCATCCTCAACGTAGAACTCATGCTCGGTGCTTTCGTGATCCCGCTCAGTGTC
ATCAGCTACTGCTACTACCGCATTTCAGAAATCGTTGCGGTGTCTCAGTCGCGCC
ACAAAGGCCCGCATTGTACGGGTACTTATAGCGGTCGTGCTTGTCTTTATCATCTTT
20 TGGCTGCCGTACCACCTGACGCTGTTTGTGGACACGTTGAAACTGCTCAAATGGA
TCTCCAGCAGCTGCGAGTTCGAAAAATCACTCAAGCGCGCGCTCATCTTGACCGA
GTCACTCGCCTTTTGTCACTGTTGTCTCAATCCGCTGCTGTACGTCTTCGTGGGCA
CCAAGTTTCGGCAAGAACTGCACTGTCTGCTGGCCGAGTTTCGCCAGCGACTGTT
TTCCCGCGATGTATCCTGGTACCACAGCATGAGCTTTTCGCGTCGGAGCTCGCCG
25 AGCCGAAGAGAGACGTCTTCCGACACGCTGTCCGACGAGGCGTGTGCGGTCTCA
CAAATTATACCGTAA

SEQ ID NO:4

Amino acid sequence for HCMV VHL/E US28

30 MTPTTTTAELTTEFDYDDEATPCVLTDVLNQSKPVTLFLYGVVFLFGSIGNFLVIFTIT
WRRRIQCSGDVYFINLAAADLLFVCTLPLWMQYLLDHNSLASVPCTLLTACFYVAM
FASLCFITEIALDRYYAIVYMRYRPVKQACLFSIFWWIFAVIIAIPHFMVVTKKDNQC
MTDYDYLEVSYPILNVELMLGAFVIPLSVISYCYRISRIVAVSQSRHKGRIVRVLIA
VVLVFIIFWLPYHLTLFVDTLKLLKWISSSCEFESLKRALILTESLAFCHCCLNPLLY

VFVGTKFRQELHCLLAEFRQRLFSRDVSWYHSMFSRSPSRRETSSDTLSDEACRV
SQIIP*

5 SEQ ID NO:5

Nucleotide sequence for RhUS28.1

ATGAATAACACATCTTGCAACTTCAACGTCCTCAACGCATCGGCACCAAGCC
GATACATAGCTATTGCTATGTACAGCATTGTTATCTGTATCGGGTTGGTTGGAAA
CCTGCTGTTATGCATCGTGTTAGTCAAGAAACGCAAACCTGCGATATTCCAGCGAT
10 GTTTATTTTTTCCACGCCTCTATGGCCGACCTCGTCAGCACTGTCATGCTACCGCT
CTGGCTACATTATGTCCTCAACTTTGCCCAACTCTCTCGAGGAGCCTGTATCAGCT
TTTCGGTGACTTTCTATGTTCCCTTTTCGTTTCAGGCCTGGTTACTCATTTCATCG
CTATGGAGCGATATTCCAACCTTAGTATGGATGGCACCCATTAGCGTTAAGACGGC
CTTTAAACACTGCATAGGAACCTGGATCGTATCTGCCTTCGTGGCATCACCTAC
15 TACGCATACAGAACTCACACGACGAACACGAATGCATTCTAGGAACTACACT
TGGCACATTAACGAACCGCTACACACGTGTATGGATGTGGTGATCATAGTATGGA
CCTTTTTGGCCCCAGTACTGGTAACCATTATAGCAAGCGTCAAAATGAGACGAAC
GACCTGGGGCAATACTAGGTAAACGAAAAGAACAGCGACATTCTTATAGTACT
AGTTGTCATGACAGTGTTCTTTTGGGGACCGTTTAATATCGTGTTGGTTATTGACA
20 ATATTTTACAGAGATACTATGATACCACGAATTGCGATGTAGAAAAGATTAAAC
ATATCATGGCTATGATCTCAGAAGCCATTGTTTATTTTCGCGGTATTACAGCACCT
ATTATTTATGTAGGGATTAGTGGCAGATTTTCGCGAAGAGATTTACTCTCTGTTTA
GACGCCAGCCGTATAACGATTTGGACCCCGATGCCAATCAATTCATGATTGAACT
CACTAGCCAGGGAAGAAGTAGAAATAGAAATGCTAGACAATCGGAAAGCAATG
25 TACCGCAACCAGAAGAATGCTTCTGGTAA

SEQ ID NO:6

Amino acid sequence for RhUS28.1

MNNTSCNFNVTNLNASAPSRYIAIAMYSIVICIGLVGNLLLCIVLVKKRKLRYSSDVYFF
30 HASMADLVSTVMLPLWLHYVLNFAQLSRGACISFSVTFYVPLFVQAWLLISIAMERY
SNLVWMAPISVKTAFAKHCIGTWIVSAFVASPYAYRNSHDEHECILGNYTWHINEPL
HTCMDVVIIVWTFLAPVLVTIIASVKMRRTTWGNTRLNEKNSDILIVLVVMTVFFWG
PFNIVLVIDNILQRYDNTNCDVEKIKHIMAMISEAIVYFRGITAPIIYVGISGRFREEIY
SLFRRQPYNDLDPDANQFMIELTSQGRSRNRNARQSESNPQPEECFW*

SEQ ID NO:7

Nucleotide sequence for RhUS28.2

5 ATGACCAACGCCGGACACTGTCACATAAACGAAAGTCTCGCGTCGTATGGAATC
GCTCCCGCAGCTACCATTACCTTATACAGCATTGCGGGAATCTGCGGTGTCACGG
GAAATCTGTTAATACTTTTGGTTTTGTTACGAGACGCATACACTGGTTCGCAA
TGACATCTACTATCTCAACATGATCTTTACAGACTTTCTTGTTTTTCATTACATTAC
CCGCCTGGGTTTACTACCTGCTGAATTACACACAACCTCTCACACTATGCCTGCATT
10 GCTCTATCATTTGTTTTTTACGTTTCCATTTTATTCAAGCTGACTTTATGGTAGCA
GTGGCTATCGAGCGTTATCGAAGCCTAGTGAAAAACAAACCCCTTAGCGTAAAA
AAAGCCAGCGTCAGCTGCGCGTGCATCTGGATCATTGTTATTATAGTGTCTTCAC
CATACTACATGTTTAGATCGCAACACGAAACAAATTCTTGCATTCTAGGAAACTA
CACCTGGCATATGAACAGTCCTTTTCGCACCACAATGGACGCATCCATTAAACATT
15 TGGTCTTTTGTCTGTTCCGGCCGTGACGACCTTGTTAATAGCCAGACGAATTTATGT
ATGTACTTCAGGCAACAAAAAATGAACGCCAGAGCCAGTGGTTTGTAGAGGC
CATGGTGATTAGCATGTTATTCTTCGGAGGACTTTTCAACCTGAACATCTTTCGAG
ACATAGTTTCGGACACATCGGAAGACAATAAAGACTGCACATATCTTAAGCAGG
AACACTTTATTTCGCATGGTCGGTGTGGCCCTCGTTTACGGGCGCGCTATATTCAA
20 CCCTTTTATGTATATGTGTGTGAGTACCAGATTGCGCCAAGAAATAAAATGTTTG
TTTATGCGAATACCTTATGAAACACTAGATGCAGAACACGCTAAACTCATGGTTA
ATTTAAAAAACAGAAATGCTAATGTACCCGATCCTAAACCTCGTGAATATGAATC
TGTGTTATAG

25 SEQ ID NO:8

Amino acid sequence for RhUS28.2

MTNAGHCHINESLASYGIAPAATITLYSIAGICGVTGNLLILLVLFTRRIHWFANDIYY
LNMIFDFFLVFITLPAWVYYLLNYTQLSHYACIALSFVYVSIFIQADFMVAVAIERYR
SLVKNKPLSVKKASVSCACIWIIIVVSSPYMFRSQHETNSCILGNYTWHMNSPFRTT
30 MDASINIWSFVVPVAVTTLLIARRIYVCTSGNKKMNARASGLLEAMVISMLFFGGLFN
LNIFRDIVSDTSEDNKDCTYLKQEHFIRMVGVALVYGRAIFNPFMYMCVSTRRLRQEI
CLFMRIPTYETLDAEHAKLMVNLKNRNANVPDPKPREYESVL*

SEQ ID NO:9

Nucleotide sequence for RhUS28.3

ATGACCAACACTAACAATACGACTTGTCATCTCAACGGAAC TTTCGAAACTTTTA
AAATCACCCGTCCAGTAGCCATCAGCGCCTACACTGTACTCGTGGTTATCGGACT
TTTGGGAAACATTGTGCTGCTCAGCGTGCTCGTCGTGAAACGCAAGCTCAAGTTT
5 CCGAATGACATTTACTTTTTCAACGCGTCTTTGGCAGACGTTTTTGGCGTCTGCAT
GTTGCCCCGCCTGGGTAACTATGCACTGGACTCCACACA ACTTAGCAAGTTCTCA
TGTATCACTTTTACGTTTGGTTTTTACGTCTCCCTGTTTCATCCAGGCCTGGATGCT
CATTCTGGTCACCCTGGAGCGATACGGATCTCTAGTCTGGATCGCCCCGATCACC
AGAAACAAAGCCATAGCGAATTGTGTACTCTTTTGGCTTGTTTCCATCTTCTTGGC
10 CGCACCTTACTACTCTTTTAGAAACGAAAGCAACGAACACCAATGCATCATGAG
AAACTATACCTGGAGCGTTGGTGAAACATGGCACATAGCCCTGGATTTCTTAATT
ACGCTCATTACATTTATCATGCCAGTGACTATTGTGTTAGCTCTGAGTTTCAAAT
GGCCAGATGGTCAACCTTTGGTTACAGAAACCTCACCAGCAGAACCAGTCTTATC
CTTATTTTGATACTGACAGTAGCAGCAGGGTTCTGGGGACCTTTTCACCTATTTAT
15 GTTTATAGAAAACGTGGCAGGGCAGATTTACCACATTCAAAGGATTGCTGGTA
CTTACAGCTCAGACACTTGTGTAGCTTGATGACCGAAACCCTAGTGTTTCTACGT
TCAGTTTTTAACCCTTATATTTATATGATAATCAGTTACAAGTTTAGGCAGCAGGT
GCGCAGTCTACTCAAGCGTACTCAGTATGATGCTTTGGACACGACTCAGTTAGCA
GAAACTATGCAGCTGAAAGCGAAAGGTGTGCCGGTGTCCGACCCCGCGCCGCAT
20 GACTGCGAATGCTTTTTGTAA

SEQ ID NO:10

Amino acid sequence for RhUS28.3

MTNTNNTTCHLNGTFETFKITRPVAISAYTVLVVIGLLGNIVLLSVLVVKRKLKFPNDI
25 YFFNASLADVFAVCMLPAWVNYALDSTQLSKFSCITFTFGFYVSLFIQAWMLILVTLE
RYGSLVWIAPITRNKAIANCVLFWLVSIFLAAPYY SFRNESNEHQCIMRNYTWSVGE
TWHIALDFLITLITFIMPVTIVLALSFKMARWSTFGYRNLT SRTSLILILILTVAAGFWG
PFHLFMFIENVAGQIYHIQKDCWYLQLRHLC SLMTETLVFLRSVFNPIYMIISYKFR
QQVRSLLKRTQYDALDTTQLAETMQLKAKGVPVSDPAPHDCECFL*

SEQ ID NO:11

Nucleotide sequence for RhU28.4

ATGAATTCGAGCCAGCACAAACATAAGCGTGTTTCTCTCCATTGGAGCAGGGCCCG
TCATTACCGGATACACGTGCGTTTTTCTGTTCGGGATTCTGGGACACTTTTACTTG

TATTGGAAAAACCATCAGAGACGACACCGGACAAACAGTTTCAGTGATGTTTTAT
TTCGACATCTCATGATCACCGAAGAGGTCTTTACCCTCACCATTCCCGTCTGGGC
GTATCACTTAACACTACGCGCAACTTACCGGGCTCGTGGTGCCGAAGTCTCACC
TTCGTTTTTTATCTAACGGTATTCGCTCGTGCCTTCTTTTACCTGCTCCTCATCTGG
5 GACCGATACAGCGTAATCATCTGCAGACACCCTCTCCCCGTTAATCTGAACTACA
GTCAGGTCATAGGCCTGTCTGTCTGGCTGGTTGCCGTAAGTGTGAGCATCACCGTT
CTCCATTTTTTAACGGAAGTGTGAAACAATGCCTGGGCAACATGGGCAGCATACCC
AGCGAATCGTCTGCCGTTCTTAACCTGGAAGTGCACCTGTGCTCCTTCTGGTTACC
GCTCATCATGTGCGGCTAACTGTTACTACCAAGCAAAACGCCGAGCATCGCCTGAC
10 CAACTCCACGAACTTTACCGATGCAGTTTGCTAATTACCATTATCACAACCTTACG
CTATCGTATGGTTTTCCTTTCCATCTCGCTTTACTCATAGACGCCCTGATTAGCATA
AGCCATGTAGAACCCTCTAGCGCTCTCCACTGGGCATCCATTGTCGTTACCTGTA
AATCATTTACATTTGTATATGCGGGCATAAGCCCACTAGTGTATTTACATGCTG
CCCCACCGTACGTCGCGAACTGCTGATGTCTCTACGTCCATTCTTCACCTGGATT
15 CCAGCAAAACGCGGCGAGGCTACGCTCCGATTAAACACAACCTTTAAACATCC
CCGACGAGCCGATAGATAACAAGTCACCGCACCTGTAAACGAATAA

SEQ ID NO:12

Amino acid sequence for RhU28.4

20 MNSSQHNISVFLSIGAGPVITGYTCVFLFGILGHFYLYWKNHQRRHRTNSFSDVLFRRH
LMITEEVFTLTIPVWAYHLTTHGNLPGSWCRSLTFVFYLTVFARAFFYLLLIWDRYSV
IICRHPLPVNLNYSQVIGLSVWLVAVLSASPFSIFNGSVKQCLGNMGSIPESSAVLNL
EVHLCSEFWLPLIMSANCYYQAKRRASPDQLHELYRCSLLITIITTYAIVWFPFHLALLI
DALISISHVEPSSALHWASIVVTCKSFTFVYAGISPLVYFTCCPTVRRELLMSLRPFFT
25 WISSKTRRGYAPIKTQPLNIPDEPIDNKSPHLLNE*

SEQ ID NO:13

Nucleotide sequence for RhUS28.5

30 ATGACTACCACCACAATGAGTGCTACCACGAATTCCAGTACCACGCCTCAAGCA
AGCAGCACCACGATGACAACGAAGACAAGCACTCCTGGCAATACAACACTACTGGC
ACTACGTCCACCCTGACAACGATATCAACAACCTTCTAATGCTACCAGCATAACGT
CTAATTTAAGCACTACCGGAAACCAAACCTGCAACTACCAATGCTACTACCTTCAG
TTCCACATTAACAACATCTACAAATATAAGCAGTACATTTTCGACAGTTTCTACC

GTCGCATCCAATGCAACATGTAATTCTACAATCACAACGAATATTACAACCTGCTT
 TTACTIONAGCAGCAAACACTACCGCAAGCAGCCTCACCAGCATCGTAACTTCACT
 TGCCACTACCATTGAAACCACATCATTGATTATGATGAGTCAGCAGAAGCTTGC
 AACTTAACAGACATCGTTCATACTACTAGATCAGTGACAGTTACTTTCTATACTA
 5 TCATATTCATACTCGGCCTTTTGGGAAACTTTCTGGTTCTTATGACCATCATTG
 AACCGTCGCATTTCTTTATGGTTGAAATATATTTTCGTTAATCTAGCAATCTCCGA
 TCTTATGTTTGTATGTACTTTACCATTTTGGATAATGTATCTTCTTGAGCACGACG
 TCATGTCACATGCATCCTGTGTAGCAATGACAGCCATTTTTTATTGCGCGCTGTT
 GCCAGCACTGTTTTCTCTTGCTAATTGTTTTAGACAGATGTTACGCTATTCTATT
 10 AGGTACAGAAAAAGCAAATAGACGTTTATTGCGCAATGCTGTTTCTGGATGCATG
 CTCATGTGGGGATTGTGTTTCATTTTAGCATTACCTCATTTTATCTTTATGAAGAA
 AGGAACCAACGTATGTGTAGCAGAGTATGAACCAGGACTTAACAATTTCTATGTT
 ATTTTTATCAATACTGAGGTGAACCTATGCACCCTAGTTTTGCCAGCCGCAGCCA
 TTATCTACTGGTATCTTAAACTAACCAAAGCACTCAAACCCATGAACGACTGCG
 15 TCATAGGCTAACGTCTCTAAACATAGTGTTAGCTGTTGTCATTGTATTTGCTTTGT
 TTTGGCTGCCGTATAATCTCATGCTTATGATGTATAGCTTAGTTCACATGCAGATA
 CCTTGGGAATGCAGCTCTGAAAAAATACTGAGACGAAGTTTAATTATTACAGAAT
 CCATCGCCCTCAGTCACTGTTGCATCAACCCCATTTATCTACTTGCTCTTCGGACCT
 CGCTGTCGAAGCGAGTTCTGTACCTGTTGCGATGTTGCTTTACGCGCTTATGTCC
 20 ACACAGATCCTGGAGTTCCATACGTGCAGAGACGGTGTCCATCAGTCTCAGTCAC
 TCACAGGTATCTGCATCATCTGAGGATGATGACAACGATGTGCATGATGAATTGC
 AATTTTTTAATTGA

SEQ ID NO:14

25 Amino acid sequence for RhUS28.5
 MTTTTMSATTNSSTTPQASSTMTTKTSTPGNTTTGTTSTLTTISTTSNATSITSNLSTT
 GNQTATTNATTFSSLTSTSTNISSTFSTVSTVASNATCNSTITTNITTAFTTAANTTASS
 LTSIVTSLATTIETTSFDYDESAEACNLTDIVHTTRSVTVTFYTHIFILGLLGNFLVLMTHI
 WNRRI SFMVEIYFVNLAISDLMFVCTLPFWIMYLLEHDVMSHASCVAMTAIFYCALF
 30 ASTVFLLLVLDRCYAILLGTEKANRRLLRNAVSGCMLMWGLCFILALPHFIFMKKG
 TNVCVAEYEPGLNNFYVIFINTEVNLCTLVLPAAAIYWYLKLTALKTHERLRHRLT
 SLNIVLAVVIVFALFWLPYNLMLMMYSLVHMQIPWECSSEKILRRSLIITESIALSHCC
 INPIYLLFGPRCRSEFCHLLRCCFTRLCPHRWS SIRAETVSISLSHSQVSASSED DDN
 DVHDELQFLI*

SEQ ID NO:15

Nucleotide sequence for HCMV AD169 UL78

5 ATGTCCCCTTCTGTGGAGGAGACTACCTCAGTCACCGAGTCCATCATGTTCGCTA
TTGTGAGTTTCAAACACATGGGCCCCGTTTCGAAGGCTACTCTATGTTCGGCCGATCG
CGCCGCCTCGGATCTACTCATCGGCATGTTTCGGCTCCGTTAGCCTGGTCAACCTG
CTGACTATCATCGGTTGCCTCTGGGTGTTGCGTGTTACGCGGCCGCCCGTGTCCGT
GATGATTTTTACTTGAATCTGGTACTTAGTCAGTTTTTTTTCCATCCTGGCCACCA
10 TGTTGTCCAAGGGTATCATGCTGCGTGGCGCTCTAAATCTCAGCCTCTGTCGCTTA
GTGCTCTTTGTGCGACGACGTGGGCCTATATTCGACGGCGTTGTTTTTCCTCTTTCT
GATACTGGATCGTCTGTCGGCCATATCTTACGGCCGTGATCTCTGGCATCATGAG
ACGCGCGAAAACGCCGGCGTGGCGCTCTACGCGGTCGCCTTTGCCTGGGTTCTTT
CCATCGTAGCCGCTGTGCCCACCGCCGCTACGGGTTCCTGGACTACCGTTGGCT
15 AGGCTGTCAGATCCCTATACAGTATGCCGCGGTGGACCTCACCATCAAGATGTGG
TTTTTGCTGGGGGCGCCCATGATCGCCGTAAGTGGTAACTGGTGGTGGTGGTGGTGGT
ACAGCGATCGGCGCGACACGTCTGGTCCTACGTGGGTCGTGTCTGCACCTTCTA
CGTGACGTGTCTCATGCTGTTTGTGCCCTACTACTGCTTCAGAGTCCTACGCGGTG
TACTGCAGCCCGCTAGCGCGGCCGGCACCGGTTTCGGCATTATGGATTACGTGGA
20 ATTGGCTACGCGTACCCTTCTCACCATGCGTCTTGGCATTCTGCCGCTCTTTATCA
TTGCGTTCTTCTCCCGCGAGCCACCAAGGATCTGGATGACTCCTTTGATTATCTG
GTCGAGAGATGTCAGCAAAGCTGCCACGGTCATTTTCGTACGTTCGGTTGGTGCAGG
CGTTGAAGCGGGCTATGTATAGCGTGGAGCTGGCCGTGTGTTACTTTTCTACGTC
CGTCCGAGACGTGCGCGAGGCGGTGAAAAAGTCCTCCAGCCGTTGTTACGCCGA
25 CGCGACGTTCGGCGGCCGTTGTGGTAACGACAACCACGTTCGGAGAAAGCCACGTT
GGTGGAGCACGCGGAAGGCATGGCTTCCGAAATGTGTCCTGGGACTACGATCGA
TGTTTCGGCCGAAAGTTCCTCCGTCCTCTGCACCGACGGCGAAAACACCGTCGCG
TCGGACGCGACGGTGACGGCATTATGA

30 SEQ ID NO:16

Amino acid sequence for HCMV AD169 UL78

MSPSVEETTSVTESIMFAIVSFKHMGPFEGYSMSADRAASDLLIGMFGSVSLVNLLTII
GCLWVLRVTRPPVSVMIFTWNLVLSQFFSILATMLSKGIMLRGALNLSLCRLVLFVD
DVGLYSTALFFLFLILDRLSAISYGRDLWHHETRENAGVALYAVAFWVLSIVAAMP

TAATGSLDYRWLGCQIPIQYAAVDLTIKMWFLLGAPMIAVLANVVELAYSDDRRDHV
WSYVGRVCTFYVTCLMLFVPYYCFRVLRGVLQPASAAGTGFGIMDYVELATRTLTLT
MRLGILPLFIHAFSREPTKDLDDSFHYLVERCQQSCHGHFVRRLVQALKRAMYSVEL
AVCYFSTSVRDVAEAVKKSSSRCYADATSAAVVTTTTSEKATLVEHAEGMASEMC
5 PGTTIDVSAESSVLCTDGENTVASDATVTAL*

SEQ ID NO:17

Nucleotide sequence for RhUL78

10 ATGATTACGGAGCGCGTCCTCGCAGGCATCCTCGCGGGCATGACGGCCGCGGGG
AGTTTGGTCATTCTCCTCGCGGTTGTTATGTGGTTGAACATGTTAGATCGCGCTGG
CATGCCAATGGCCGTTGGGCATTACACAGGGAACCTGGTGTGACTCAGGTCATC
TGTATCTTCTCCATGCTGGCGTCTAAAATTGTTGGCATGACGAGTGCGGCCAACA
TGGGCTTCTGCGGCATCGTGGTTTTTCTGGAAGACACTGGCCTCTATGTCACCTCG
15 CTGCTCTTCATGTTTATGATCCTGGATCGCATGGCGGCTTTTCTTAACGGGCGTCT
TTTCTGGAGGCAGCAGACGACGAAGCAGAATCTGAGTACAAGCGTGTACATTAT
TCTGTTTTGCTGGGTGTTGGGAATGGCCGCGGCTGTTCCCAGCGCGGCTGTGGCT
GCACCCAATTCCAGGTGGGAACGCTGCGAAATTCCAGTGTCATATGCCGCAATCG
ACATGATTGTGAAGCTCTGGTTTGTGCTGTTGGCACCCGTCGTGCTGATTATGGCT
20 GTGATCATTCAATCTTCCTATCATCGTGATCGGGAGAGGATCTGGTACTATGCCA
GACGTGTGTTTCATGTTCTACACGGCCTGCTTTGTCATGATGGTGCCTTATTACTTC
GTCAGAGTCATGCTGAGCGACTTTGCTTTGGTTGATATAAAAACAAAAACGGCG
AACAGCGACGGTTGTGATTTCGACATTTCTTGATTATCTGAACATGTTCACTCAG
TGATTTACAGTTTTAAGTTGGTGGTGTGTTGCTTTGTTTCATTGTCCTGTTTTGCTCCA
25 TAAACCCGATGGAAACGCTGGAAGAATGCTTGGAGAGGGCCGATGCTGAGAGGC
AAAGTCGGTCAGAAGCATCCCAGGGTGAAAGGAGGCTGCCAATCAACACATGCT
GTATAAAGTTGATTGAATTGATAAAGCAGTATGTAAGCACTCTCTCTAAAGCCAC
GAGGGACAATTCTGGCGAAAGGGCCAATTTGCCAGAGAATGCTGAAGATATTGG
AACAACCTGGCAGTGATCAGCTACCGACTGAGGTCACCGTGACCCCAAATTCATC
30 GGCTGTGTTTAGCACTGGAGGAACGGTGTCTCCAGTCTAA

SEQ ID NO:18

Amino acid sequence for RhUL78

MITERVLAGILAGMTAAGSLVILLAVVMWLNMLDRAGMPMAVGHYTGNLVLTQVI
CIFSM LASKIVGMTSAANMGFCGIVVFLED TGLYVTSLLFMFMILDRMAAFLNGRLF
WRQQTTKQNLSTSVYIILFCWVLGMAAAVPSAAVAAPNSRWERCEIPVSYAAIDMIV
KLW FVLLAPVVLIMAVIIQSSYHRDRERIWYYARRVFMFYTACFVMMVPYYFVRVM
5 LSDFALVDIKTKTANS DGCDSTFLDYLNMFTHVIYSFKLVVFALFIVLFCSINPMETLE
ECLERADAERQSRSEASQGERRLPINTCCIKLIELIKQYVSTLSKATRDNSGERANLPE
NAEDIGTTGSDQLPTEVTVTPNSSAVFSTGGTVSPV*

10 SEQ ID NO:19

Nucleotide sequence for HCMV AD169 UL33

ATGACAGGGCCGCTATTCGCCATTCGAACCACCGAAGCCGTACTCAACACATTCA
TCATCTTCGTGGGCGGTCCACTTAACGCCATAGTGTTGATCACGCAGCTGCTCAC
GAATCGCGTGCTTGCTATTCGACGCCCACCATTTACATGACCAACCTCTACTCT
15 ACTAATTTTCTCACGCTTACTGTGCTACCCTTTATCGTACTCAGCAACCAGTGGCT
GTTGCCGGCCGGCGTGCCCTCGTGTAATTTCTATCGGTGATCTACTACTCAAGC
TGCACAGTGGGCTTTGCCACCGTAGCTCTGATCGCCGCCGATCGTTATCGCGTCC
TTCATAAACGAACATACGCACGCCAATCATACCGTTCAACCTATATGATTTTGCT
ATTGACATGGCTCGCTGGACTAATTTTTTCCGTGCCCCGACGCTGTTTACACCACG
20 GTGGTGATGCATCACGATGCCAACGATACCAATAATACTAATGGGCACGCCACC
TGTGTACTGTACTTCGTAGCTGAAGAAGTGCACACAGTGCTGCTTTCGTGGAAAG
TGCTGCTGACGATGGTATGGGGTGCCGCACCCGTGATAATGATGACGTGGTTCTA
CGCATTCTTCTACTCAACCGTACAGCGCACGTACAGAAACAAAGGAGTCGTACC
TTAACCTTTGTTAGCGTGCTACTCATCTCCTTCGTGGCGCTACAACTCCCTACGT
25 CTCTCTCATGATCTTCAACAGTTATGCCACAACCGCCTGGCCCATGCAGTGTGAA
CACCTCACACTGCGACGCACCATTTGGCACGCTGGCGCGTGTGGTGCCCCACCTAC
ACTGCCTCATTAATCCCATCCTGTACGCGCTGCTGGGTCATGATTTTCTGCAACGC
ATGCGGCAGTGTTTCCGCGGTGAGTTGCTGGACCGCCGCGCTTTCCTGAGATCGC
AGCAGAATCAGCGAGCTACAGCGGAGACAAATCTAGCGGCTGGCAACAATTCAC
30 AATCAGTGGCTACGTCATTAGACACCAATAGCAAAAATAACAATCAGCACGCCA
AACGCAGCGTGTCTTTCAATTTTCCCAGCGGTACGTGGAAAGGCGGCCAGAAAA
CCGCGTCCAACGACACATCCACAAAAATCCCCCATCGACTCTCACAATCGCATCA
TAACCTCAGCGGGGTATGA

SEQ ID NO:20

Amino acid sequence for HCMV AD169 UL33

MTGPLFAIRTTEAVLNTFIIFVGGPLNAIVLITQLLTNRVLGYSTPTIYMTNLYSTNFLT
5 LTVLPFIVLSNQWLLPAGVASCKFLSVIYYSSCTVGFATVALIAADRYRVLHKRTYAR
QSYRSTYMILLTLWLAGLIFSVPAAVYTTVVMHHDANDTNNTNGHATCVLYFVAEE
VHTVLLSWKVLLTMVWGAAPVIMMTWIFYAFFYSTVQRTSQKQRSRTLTFVSVLLIS
FVALQTPYVSLMIFNSYATTAWPMQCEHLTLRRITIGTLARVVPHLHCLINPILYALLG
HDFLQRMQRQCFRGQLLDRRAFLRSQQNQQRATAETNLAAGNNSQSVATSLDTNSKNY
10 NQHAKRSVSFNFPSGTWKGGQKTASNDTSTKIPHRLSQSHHNLSGV*

SEQ ID NO:21

Nucleotide sequence for HCMV AD169 UL33 spliced

15 ATGGACACCATCATCCACAACCTCGACCCGCAACAACACTCCTCCGCACATCAATG
ACACTTGCAACATGACAGGGCCGCTATTCGCCATTTCGAACCACCGAAGCCGTACT
CAACACATTCATCATCTTCGTGGGCGGTCCACTTAACGCCATAGTGTTGATCACG
CAGCTGCTCACGAATCGCGTGCTTGGCTATTCGACGCCACCATTTACATGACCA
ACCTCTACTCTACTAATTTTCTCACGCTTACTGTGCTACCCTTTATCGTACTCAGC
20 AACCAGTGGCTGTTGCCGGCCGGCGTGGCCTCGTGTAATTTCTATCGGTGATCT
ACTACTCAAGCTGCACAGTGGGCTTTGCCACCGTAGCTCTGATCGCCGCCGATCG
TTATCGCGTCCTTCATAAACGAACATACGCACGCCAATCATAACCGTTCAACCTAT
ATGATTTTGCTATTGACATGGCTCGCTGGACTAATTTTTTCCGTGCCCCGACGCTGT
TTACACCACGGTGGTGATGCATCACGATGCCAACGATACCAATAATACTAATGG
25 GCACGCCACCTGTGTACTGTACTTCGTAGCTGAAGAAGTGCACACAGTGCTGCTT
TCGTGGAAAGTGCTGCTGACGATGGTATGGGGTGCCGCACCCGTGATAATGATG
ACGTGGTTCTACGCATTCTTCTACTCAACCGTACAGCGCACGTACAGAAACAAA
GGAGTCGTACCTTAACCTTTGTTAGCGTGCTACTCATCTCCTTCGTGGCGCTACAA
ACTCCCTACGTCTCTCTCATGATCTTCAACAGTTATGCCACAACCGCCTGGCCCAT
30 GCAGTGTGAACACCTCACACTGCGACGCACCATTTGGCACGCTGGCGCGTGTGGT
GCCCCACCTACACTGCCTCATTAATCCCATCCTGTACGCGCTGCTGGGTCATGATT
TTCTGCAACGCATGCGGCAGTGTTTCCGCGGTGAGTTGCTGGACCGCCGCGCTTT
CCTGAGATCGCAGCAGAATCAGCGAGCTACAGCGGAGACAAATCTAGCGGCTGG
CAACAATTCACAATCAGTGGCTACGTCATTAGACACCAATAGCAAAAACCTACAA

TCAGCACGCCAAACGCAGCGTGTCTTTCAATTTTCCCAGCGGTACGTGGAAAGGC
GGCCAGAAAACCGCGTCCAACGACACATCCACAAAAATCCCCCATCGACTCTCA
CAATCGCATCATAACCTCAGCGGGGTATGA

5

SEQ ID NO:22

Amino acid sequence for HCMV AD169 UL33 spliced

MDTIIHNSTRNNTPPHINDTCNMTGPLFAIRTTEAVLNTFIIFVGGPLNAIVLITQLLTN
RVLGYSTPTIYMTNLYSTNFLTTLVLPFIVLSNQWLLPAGVASCKFLSVIYYSSCTVGF
10 ATVALIAADRYRVLHKRTYARQSYRSTYMILLLTWLAGLIFSVPAAVYTTVVMHHD
ANDTNNTNGHATCVLYFVAEEVHTVLLSWKVLLTMVWGAAPVIMMTWIFYAFFYS
TVQRTSQKQRSRTLTFVSVLLISFVALQTPYVSLMIFNSYATTAWPMQCEHLTLRRTI
GTLARVVPHLHCLINPILYALLGHDFLQRMQRQCFRGQLLDRAFLRSQQNQQRATAET
NLAAGNNSQSVATSLDTNSKNYNQHAKRSVSFNFPSGTWKGGQKTASNDTSTKIPH
15 RLSQSHHNLSGV*

SEQ ID NO:23

Nucleotide sequence for RhUL33

20 ATGACCAATCTTTACTCTGCCAATTTTCTCACCTTGATAGTACTTCCTTTTATCGTT
TTAAGCAATCAACACCTTTTACCTGCCAGTGCAGTAACCTGTAAATTTCTCTCCCT
GTTGTACTACTCTAGCTGCAGCGTAGGTTTTGCTACAGTGGCACTGATAGCGGCC
GACCGATACCGAGTGATTCATCGCCGAACCTCAAGCTCGCCAATCCTACCGTAACA
CATATATGATAGTAGGCTTAACGTGGCTCATTGGCTTGATCTGCGCTACCCCCGG
25 GGGGGTCTACACAACCATTGTAGCTCACCGCGATGGGGAAAGTGATGCTCAAAG
ACACAATACTTGCATTATGCACTTTGCGTATGATGAAGTTTACGTCCTCATGGTCT
GGAAACTTCTCATCGTTTTTAGTCTGGGGCATAGTGCCAGTTGTCATGATGAGCTG
GTTTTACGCGTTTTTTTACAATACTGTACAAAGAACAGCCAAAAACAACAACGT
ACGTTGAAATTCGTAAAGGTATTACTCCTGTCAATTCATCATCATCCAACTCCCTA
30 TGTGTCAATCATGATTTTTTAACACGTATGCCACCGTAGGATGGCCGATGGAATGC
GCCGATCTAACTAGACGCCGAGTCATCAACACGTTTTCCCGTCTCGTCCCCAATC
TACATTGCATGGTCAACCCCATCCTCTACGCTCTCATGGGAAATGACTTTGTGTCT
AAAGTGGGCCAATGCTTTCGGGGGGAACTCACGAACCGTCGAACCTTTTCTGCGTT
CCAAGCAACAAGCCCGCAACTCGGACGATGTACCGACAATTGTCAGTCAACAAC

CCGCCACACCCACCATCGTCAATAAGCCCGAAAAAAACCCGCACGTAAAACGCG
GTGTATCTTTCAGCGTCAGCGCATCTTCCGAACTCGCAGCGGCCAAAAAAGCCAA
AGACAAAGCCAAGCGGCTTCCATGTCCCACCAAACCTACGTCTGACGTGA

5

SEQ ID NO:24

Amino acid sequence for RhUL33

MTNLYSANFLTIVLPFIVLSNQHLLPASAVTCKFLSLLYYSSCSVGFATVALIAADRY
RVIHRRTQARQSYRNTYMIVGLTWLIGLICATPGGVYTTIVAHRDGESDAQRHNTCI
10 MHFAYDEVYVLMVWKLIVLVWGIVPVVMMMSWFYAFFYNTVQRTAKKQQRTLKF
VKVLLLSFIIIQTPYVSIMIFNTYATVGWPMECADLTRRRVINTFSRLVPNLHCMVNPI
LYALMGNDFVSKVGQCFRGELTNRRTFLRSKQQARNSDDVPTIVSQPATPTIVNKP
EKNPHVKRGVSFSVSASSELAACKKAKDKAKRLSMHQNLRLT*

15

SEQ ID NO:25

Nucleotide sequence for RhUL33 spliced

ATGGCAGTCACTTTACGAGGCGGCAGCCCGATAAACTTTAACTCATGATTGTCA
GCCACAGAAACCGGAAATTTACGAGATACGGCTGTTTCAGCGTTCTGCTATCCG
20 TCCAGGCGGGTTATGGAAACCATTCTTCACAACCGAACGAGTGAACTAATTCCA
TTTTGCACATCAACACCACCTGCAATGTGACCGACTCACTGTACGCCGCCAACT
AGGCGAAGCCCTCGTGAACAGCGCGCTAGCTTTATTCGGTACCCCCCTCAACGCC
ATCGTCCTCGTCACACAGCTATTGGCCAACCGAGTTCATGGATACTCCACCCCGA
TTATCTACATGACCAATCTTTACTCTGCCAATTTTCTCACCTTGATAGTACTTCCTT
25 TTATCGTTTTAAGCAATCAACACCTTTTACCTGCCAGTGCAGTAACCTGTAAATTT
CTCTCCCTGTTGTACTACTCTAGCTGCAGCGTAGGTTTTGCTACAGTGGCACTGAT
AGCGGCCGACCGATACCGAGTGATTCATCGCCGAACTCAAGCTCGCCAATCCTAC
CGTAACACATATATGATAGTAGGCTTAACGTGGCTCATTGGCTTGATCTGCGCTA
CCCCCGGGGGGTCTACACAACCATTGTAGCTCACCGCGATGGGGAAAGTGATG
30 CTCAAAGACACAATACTTGCATTATGCACTTTGCGTATGATGAAGTTTACGTCCT
CATGGTCTGGAACTTCTCATCGTTTTAGTCTGGGGCATAGTGCCAGTTGTCATG
ATGAGCTGGTTTTACGCGTTTTTTTACAATACTGTACAAAGAACAGCCAAAAAAC
AACAACGTACGTTGAAATTCGTAAAGGTATTACTCCTGTCATTCATCATCATCCA
AACTCCCTATGTGTCAATCATGATTTTTTAACACGTATGCCACCGTAGGATGGCCG

ATGGAATGCGCCGATCTAACTAGACGCCGAGTCATCAACACGTTTTCCCGTCTCG
TCCCCAATCTACATTGCATGGTCAACCCCATCCTCTACGCTCTCATGGGAAATGA
CTTTGTGTCTAAAGTGGGCCAATGCTTTTCGGGGGGAACCTCACGAACCGTCGAACT
TTTCTGCGTTCCAAGCAACAAGCCCGCAACTCGGACGATGTACCGACAATTGTCA
5 GTCAACAACCCGCCACACCCACCATCGTCAATAAGCCCGAAAAAAACCCGCACG
TAAACGCGGTGTATCTTTTCAGCGTCAGCGCATCTTCCGAACTCGCAGCGGCCAA
AAAAGCCAAAGACAAAGCCAAGCGGCTTTCATGTCCCACCAAAACCTACGTCT
GACGTGA

10 SEQ ID NO:26

Amino acid sequence for RhUL33 spliced

MAVTLRGGSPINFKLMIVSHRNRKFHEIRLFQRSAIRPGGLWKPFFTTERETNSILHIN
TTCNVTDLSLYAAKLGEALVNSALALFGTPLNAIVLVTQLLANRVHGYSTPIIYMTNL
YSANFLTIVLPFIVLSNQHLPPASAVTCKFLSLLYYSSCSVGFATVALIAADRYRVIH
15 RRTQARQSYRNTYMIVGLTWLIGLICATPGGVYTTIVAHRDGESDAQRHNTCIMHFA
YDEVYVLMVWKLIVLVWGIVPVVMMSWFYAFFYNTVQRTAKKQQRTLKFVKVL
LLSFIIIQTPYVSIMIFNTYATVGWPMECADLTRRRVINTFSRLVPNLHCMVNPILYAL
MGNDFVSKVGQCFRGELTNRRTFLRSKQQARNSDDVPTIVSQQPATPTIVNKPEKNP
HVKRGVSFSVSASSELA AAKKAKDKAKRLSM SHQNLRLT*

20 SEQ ID NO:27

CGGCCAAGATGTCCCAAGAGGTTCTGACATGAACAATCACTTTTCCGAGATAGAT
GAGTTTGTAGTGGCATTACAGAGAACTATTGGAGTGACGCTCAAGATGAAGC
25 TTCACTGGCCGTATTTCTGAACATATTGTTAGATATAGCTAGTAAAGAATCTTCTA
AAGCCATGACGTCTTTCTGACGAAGTTGAATAAATTCTATCTCACCAGTACCCAA
AGGCTGACACTCAGACAACTTTGCCAAGGCCGTTGCACCCACCATGGCATTCTGA
ATCACAGTAACATCCGTCCGAGAATCGTCACCAAAAACGGTGGCCTCCAAAGTT
CGCAGGTGAGGCCGAGCCTTTACTGGATCTCGGAAGGGATACATGTGTGCTCGCC
30 GAGTGACAGCATTAGCATTAACTCAAACTCATCTAAAAGCGATGATAAATCAG
GAATATGATAGCGCAATTCTCGATAGTAGGCCAACCAGAGGACTAATTGGTTGA
ACAGACAGCTCCGTCTGTGCAAAAACCTTTTCGCCGCATTTTCTGAGAATTTTAGG
ATGCTGCTCTAAATCTACGTTCTTTAGTCGGCAGGGTCTTTAAAAAGTTAGTG
ATGGCAGTCACTTTACGAGGCGGCAGCCCGATAAACTTTAACTCATGATTGTCA

GCCACAGAAACCGGAAATTTACGAGATACGGCTGTTTCAGCGTTCTGCTATCCG
 TCCAGGCGGGTTATGGAAACCATTCTTCACAACCGAACGGTGAGTGACATTTAAG
 ACAGTTTAATAGCCAACACTCGTAACGTCTCGGAAGCTGATAAGTTTCGTTTTTC
 CACAGAGTGAAACTAATTCCATTTTGCACATCAACACCACCTGCAATGTGACCGA
 5 CTCACTGTACGCCGCCAACTAGGCGAAGCCCTCGTGAACAGCGCGCTAGCTTTA
 TTCGGTACCCCCCTCAACGCCATCGTCCTCGTCACACAGCTATTGGCCAACCGAG
 TTCATGGATACTCCACCCCGATTATCTACATGACCAATCTTTACTCTGCCAATTTT
 CTCACCTTGATAGTACTTCCTTTTATCGTTTTAAGCAATCAACACCTTTTACCTGC
 CAGTGCAGTAACCTGTAAATTTCTCTCCCTGTTGTACTACTCTAGCTGCAGCGTAG
 10 GTTTTGCTACAGTGGCACTGATAGCGGCCGACCGATACCGAGTGATTCATCGCCG
 AACTCAAGCTCGCCAATCCTACCGTAACACATATATGATAGTAGGCTTAACGTGG
 CTCATTGGCTTGATCTGCGCTACCCCCGGGGGGGTCTACACAACCATTGTAGCTC
 ACCGCGATGGGGGAAAGTGATGCTCAAAGACACAATACTTGCATTATGCACTTTGC
 GTATGATGAAGTTTACGTCCTCATGGTCTGGAACTTCTCATCGTTTTTAGTCTGGG
 15 GCATAGTGCCAGTTGTCATGATGAGCTGGTTTTACGCGTTTTTTTACAATACTGTA
 CAAAGAACAGCCAAAAACAACACGTACGTTGAAATTCGTAAAGGTATTACTC
 CTGTCATTTCATCATCATCCAAACTCCCTATGTGTCAATCATGATTTTTTAACACGTA
 TGCCACCGTAGGATGGCCGATGGAATGCGCCGATCTAACTAGACGCCGAGTCAT
 CAACACGTTTTTCCCGTCTCGTCCCCAATCTACATTGCATGGTCAACCCCATCCTCT
 20 ACGCTCTCATGGGAAATGACTTTGTGTCTAAAGTGGGCCAATGCTTTCGGGGGGA
 ACTCACGAACCGTCGAACCTTTTCTGCGTTCCAAGCAACAAGCCCGCAACTCGGAC
 GATGTACCGACAATTGTCAGTCAACAACCCGCCACACCCACCATCGTCAATAAGC
 CCGAAAAAACC CGCACGTAAAACGCGGTGTATCTTTCAGCGTCAGCGCATCTTC
 CGAACTCGCAGCGGCCAAAAAAGCCAAAGACAAAGCCAAGCGGCTTTCATGTC
 25 CCACCAAAACCTACGTCTGACGTGAATTTTCCTAGAGGCTGCCTCCACGGGTTTA
 CATACATATCTCGGTACTTGCTACACTTGATCACTTTACTGCGGACACCACGGCC
 AATCGCATC